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A MAGAZINE FOR SCHOOLS

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VOLUME XXX NOVEMBER, 1931 NUMBER 8

LIFE IN A BLUE RIDGE HOLLOW

MARGARET A. HITCH

A MOUNTAIN SCHOOL

"Books, books!" came the call, bringing to an end the game of Prisoners' Base played by a group of mountain children beside

FIG. 1. Children of the Thoroughfare Mountain school in the Blue Ridge. The school building is in the background. Photo Courtesy Minnie M. Myer.

a little log school near the head of one of the numerous hollows of the beautiful Blue Ridge (Fig. 1). The school yard, however,—if such it might be called, delineated by hill, thorn bushes and burned-over forest (Fig. 2)—has seen little use as a play ground, for these isolated children first learned of games from the teacher of the preceding term. Moreover, school days here have been few.

Unattractive and uninviting tho this bleak little building may be to the itinerant of wider acquaintance, to the mountain folk of the community its faults are not glaring for they know nothing better. To them it brings a contact with something beyond their

mountain fastness, one of their few glimpses of the "outside." Within, the bareness is somewhat dispelled by the bright pictures adorning the walls. But even their cheerfulness cannot conceal or counteract the meagerness of furnishings and equipment: no teacher's desk or chair, no shelf or drawer for books and supplies, five desks for some score of children, four rough benches (one serving the teacher as chair and desk), a blackboard limited to one wall, a map of the world (Mercator's projection), a defective stove, a water pail, a wash basin.

The call to "Books" amid even these tools of learning has sounded all too seldom as is attested by the inability of most of

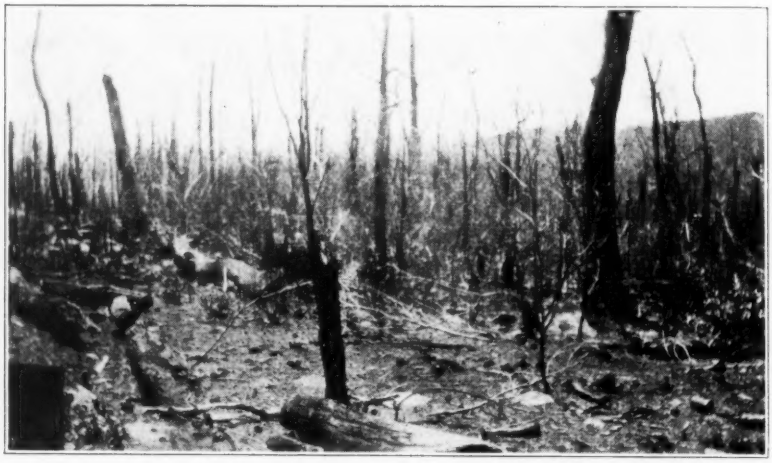

FIG. 2. Burned-over forest adjoining the school. The scene is typical of many acres in the mountains. Some of the fires are known to be of incendiary origin, instigated by jealousies and minor feuds. Half-grown boys are believed to have set most of them. In one day last summer the teacher extinguished eight fires set near the school. Another fire burned for several days in August on Old Rag Mountain, covering a wide area and consuming much timber. Photo Courtesy Minnie M. Myer.

the parents to read or write. Twenty-two years ago, six years ago, two years ago, the past summer and autumn—these are the only times when school terms were held in this community during the past half century. And none save the last term (of eight months) has exceeded three months in length.[1] The teacher of one term was

[1] The greater part of the school terms in these mountain communities have been three-month summer terms (vacation schools). In summer it is easier for the smaller children to climb the mountain trails and attend school, tho the older children are to some extent kept at home then to work. However, the choice of the season for the school terms has been primarily an adjustment to finance rather than to climate. The state

a fourteen-year-old fourth grade girl, who married and thereupon closed the school before the term was completed. At a meeting held one night in the little school house during the sixth, and supposedly

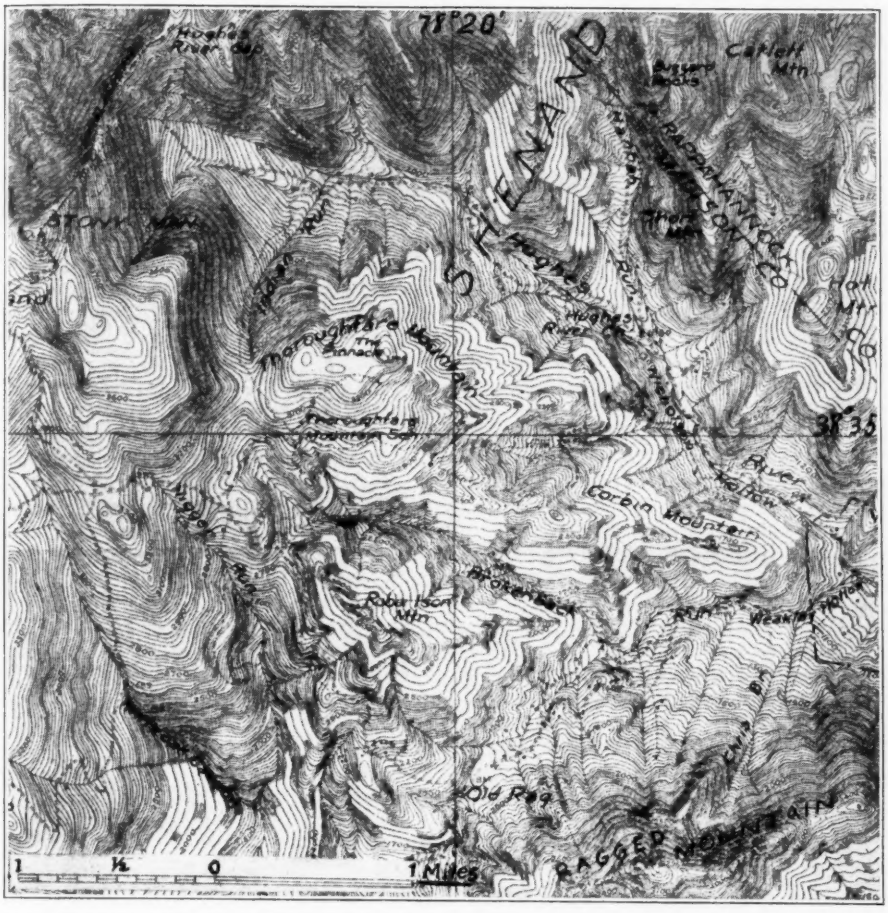

FIG. 3. Region of Corbin and Nicholson Hollows. (Section of Stony Man, Va. Quadrangle. Contour interval 20 feet. Advance sheet subject to correction. U. S. Geological Survey.)

final, month of the past term, the patrons signed a petition for an additional two months of school.[2] Of the fourteen present eleven signed with a cross, only three being able to write their names. This

pays two-thirds of the salaries of vacation school teachers, the county alone bearing the expense of other terms. Therefore, the county school officials have been interested in satisfying the mountaineers with short summer schools. The patrons in these districts are now demanding longer school terms.

[2] This was the second extension asked for this term.

community, isolated and untutored, is a part of the Old Dominion state, the first settled, and lies within seventy-five miles of the nation's capital, being included in the Proposed Shenandoah National Park.

LIFE IN A SMALL, SECLUDED HOLLOW

These mountain people are suspicious of strangers and somewhat unapproachable, but after I had spent a day at school every family knew the teacher had a visitor, and when a few days later we proposed visiting some of the homes in Corbin Hollow below the Thoroughfare Mountain school (the hollow from which about half of the school children come) all homes were opened to me as to the teacher. This hollow is said by men who know the mountain districts of the state to be one of the most isolated in the Blue Ridge. Some of the earlier settlers went into the hollow to avoid the draft for the Civil War. The land which they later abandoned was taken up by the present owners, whose descendants make up the population. The land is held by "possession right," without deeds.

One afternoon after school we made our way down into the hollow along a foot path for there is no road, or need for one. The narrow trail was stony, steep, and rough. On either side the close undergrowth clutched our clothing while above towered the tall forest trees, here and there among them a lonely chestnut bearing few nuts, since most of its limbs were killed by the blight. This winding, green, tunnel-like trail led us down nearly 500 feet in the half mile to the first cabin (Fig. 3).

On the steep slope above the cabin, in a semi-clearing where the underbrush gave way a little from the trail, we came unexpectedly upon four or five shocks of corn. This was the only corn "field," apparently, cultivated by the family living in this cabin. The log cabin itself, standing on the bank of small, tumbling Brokenback River, was badly in need of repair. Its one room and makeshift furniture spelled the acme of discomfort. A garden of sorts meandered among the boulders and fallen trees, a pumpkin vine and cabbages being most in evidence. Apples cut for drying were spread on one of the boulders altho we saw no fruit trees.

Further down the hollow, as we followed the course of the stream with the forest on either side, we came to other mountain homes. In the small clearing beside each, reaching up the steep slope, was a patch of corn, so necessary in the food supply of these

people. Late "snaps" from their gardens, if the rains came, would be dried to eke out the winter's food.[3] Here, too, were the apple trees, old and uncared for, bearing inferior fruit. Near one cabin a few bee "gums," housing captured wild bees, gave promise of an occasionally gratified sweet-tooth. A patch of parsnips growing in one small garden was destined to be used in making wine, the only use known here for parsnips until the teacher came.

Only one family of the seven or eight in this hollow possesses a cow. Two families have a few chickens; none has a pig. Nor is there a horse or other beast of burden in the hollow. A horse here would be chiefly a matter of luxury which these people can ill afford. Their gardens and hillside corn patches are worked with a hoe, or, on occasion, if not too steep to be plowed, a horse may be borrowed for a few hours from a more prosperous family on the mountain slope above the head of the hollow. As for hogs, there is no surplus of food here to provide for them.

FIG. 4. View across Corbin Hollow, showing one home in the foreground and two others in small clearings on the opposite slope. Dense forests fill the intervening area and cover practically all of the mountain side. To the left is the gap disclosing the Piedmont.

The most substantial cabin of this hollow stands in such a position on the slope that it commands a most engaging view thru a gap in the mountains and over the Piedmont (Fig. 4). At night one may watch the lights of autos skimming along a highway between populous towns of the "outside," yet sit within this secluded, backward hollow so difficult of access.

[3] The usual manner of drying string beans in the mountain districts is merely to lay them in the sun for a few days, on the lower slope of the roof or elsewhere. One of the better housekeepers, however, living above the head of the hollow, has another method. She had threaded the full pods thru the center, spacing them an inch or so on the string. In the shed where they were drying there were perhaps 200 or 300 strings of beans hanging from roof to floor.

LIFE IN A RICHER, MORE OPEN HOLLOW

In this same mountain district are other hollows less secluded, hollows into which roads—albeit poor ones—lead, and which, in comparison, look like prosperous farming communities. One of these, years ago, gained the name of Free State Hollow because, thru its inaccessibility, it served as a haven for those seeking, for any reason, freedom from the laws of the state. It is now, for the most part, called Nicholson Hollow, since most of the people living within it are named Nicholson. Into this hollow the teacher of the little log school and I trekked late one afternoon. Having crossed the intervening ridge, we followed the shoulder of the mountain, and descended thru the thick forest, first along a winding road, then by a "short cut" path. Suddenly the forest ended and we found ourselves perched on the upper edge of a clearing, high on the mountain side.

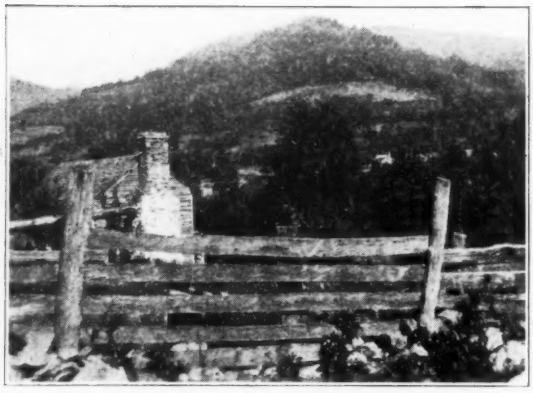

FIG. 5. View of Nicholson Hollow, where a large percentage of the lower slopes has been cleared for farm use. The steeper cleared areas are used for hay or for pasture. The only well in the hollow belongs to the house in the foreground.

From our vantage point a splendid view of this section of the hollow lay before and below us. In comparison with the region just left this presented a distinctly cultural landscape (Fig. 5). Woods there were, to be sure, notably a band of varying width marking the course of the stream, while from this strip occasional lateral arms reached out to join the thick forest cover of the higher slopes. But the greater portion of the lower slopes was occupied with orchards, corn fields with the corn now in the shock, hayfields or pastures, and here and there a cabin with a little group of farm sheds and a garden. The slopes, many of them, were quite as steep as the cultivated patches of Corbin Hollow (seemingly far too steep for soil maintenance); but this hollow was wider and more open than the smaller one, affording within it other slopes less steep.

Here there permeated an air of energy and effort wholly lacking in the smaller hollow where shiftlessness and laziness seemed so evident.

The farm on whose cleared margin we stood comprised about fifty acres, about half of it being under cultivation. With the exception of a strip, perhaps forty feet wide, of comparatively level land bordering the deeply cut little river, its area was made up of steep hillside. The owner later assured us that he used a horse in cultivating all his cleared land. Nevertheless, the degree of the slope was such that we descended his fields and orchards with caution, avoiding the path, a veritable chute, deep in dust powdered by pine logs cut on the higher slopes and recently marketed in a Piedmont town. Near the upper limits of this clearing were a dozen or more young peach trees, while on the lower slope just back of the cabin was an apple orchard. This little cabin was in good repair, the owner even having begun to cover the logs with hand rived clap-boards like those used for the roof. In the little front yard surrounded by a paling fence, an elevated platform held apples cut for drying. The occupants of this cabin, a man and his wife, were twenty-four and twenty-one years of age, respectively. They had been married seven years.

The farms in this hollow vary in size from about 25 acres to 200 or more. Corn is by far the most important crop, tho some rye and potatoes are grown. There is, therefore, scant opportunity for crop rotation. One man had grown corn in the same field for seven consecutive years. When a farmer considers the yield too small, he turns his corn field into pasture or allows it to revert to forest. He then starts a new clearing, girdling the trees in order to kill them. A new field is spoken of as a "deadenin'." Some of the farmers complained that "Land is goin' back fast" and "Crops ain't good like they used to be."

Practically every family in this larger hollow has one or two horses, two own automobiles (purchased second-hand, of course), and one owns a truck. However, the most usual form of transport within this mountain area is by means of a horse drawn "slide," or sled, which is found on most of the farms, and which operates more easily over the numerous rocks and steeps than a wagon does (Fig. 6). The slide is also cheaper to obtain and to keep in repair. It

is home-made, and when a "shoe," as the runner is called, becomes worn, the owner goes to the woods and makes a new one. There are pigs, too, in this hollow; not many, but one or more on practically every farm. The mountaineers, however, claim they do not care for ham, tho they use other parts of the hog. As hams are among the few things which may be sold from these mountain farms, the money they bring doubtless has some effect upon the local taste for ham.

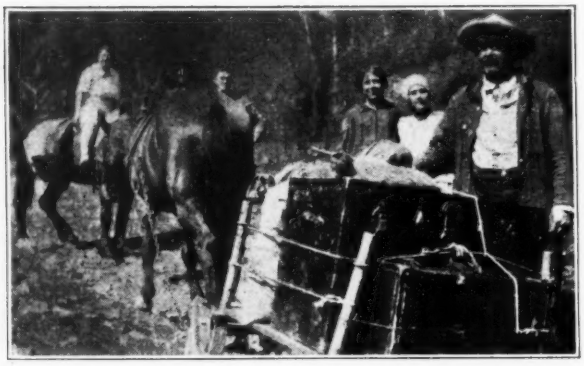

FIG. 6. Moving the teacher's trunk on a "slide" when school closed in Nicholson Hollow and opened at the Thoroughfare Mountain school. The runners of a "slide" pass more easily over the rocks and slopes of these mountain trails than the wheels of a wagon do. Photo Courtesy Minnie M. Myer.

Very large families are the exception rather than the rule in these mountain districts altho one man in Nicholson Hollow told us he was the father of eighteen children, eleven of whom were at home at the time of our visit. The oldest, about seventeen years of age, was churning. Six were helping their father, on Saturday morning, bring in fodder from the field (Fig. 7).

The meals which we shared with one of the families in this hollow during our two days' stay there, while somewhat lacking in variety of food, were well cooked and the food abundant. Breakfast, the most diversified meal, was the only one at which meat was served—once canned corn beef (from the nearest store, about three miles down the hollow) with fat back, and again chicken. There were also fried white potatoes, corn bread, biscuits, apple sauce and coffee. At noon the main dish and only one aside from the breads (similar to breakfast) and apple sauce, was a large platter of boiled sweet potatoes served hot. At supper the remnant —half or more—of this same dish, cold, constituted the meal, with the addition of the breads and apple butter. At every meal there was an abundance of good butter, cream, and milk.[4] Only five of us

[4] In one of the homes in Corbin Hollow the evening meal was in the process of preparation at the time of our visit. It consisted of a pot of boiled cabbage and a thick

sat at the table altho there were more in the family and there was unoccupied space at the table. Before most of us had finished the meal, the young housewife, who was serving, said to one of the children, "If you are thru, you can get up and I'll wash your plate so someone else can come."[5] This family owned an auto and a truck.

FIG. 7. A Blue Ridge cabin, occupied by a family of fifteen. The picture was taken from a pile of rocks similar to that appearing in the foreground. Several bee "gums" are under the tree in front of the cabin.

Apple butter making is another point of difference between these two hollows. In the smaller, more primitive one this stage of civilization apparently has not been reached, apple drying being their limit for preserving the fruit. In the larger hollow the making of apple butter is the general order and is, sometimes at least, in the nature of a social event. The cooking is done out of doors. A fire-place of stones and mud is built and over it the iron, copper-lined kettle, twenty gallons or more in size, is suspended by means of a horizontal pole resting upon two upright poles. The boiling continues for twenty-four hours with constant stirring of the butter, hence there is excellent opportunity for a social gathering with something to do. Two people usually stir at a time, and of course there must be relays. Sometimes families join in a "boiling." When the apple crop fails, or is markedly short, some of the fami-

hoe-cake cooked on a griddle. At a meal some days later with a family in another community—a family of more education and apparently with certain outside contacts—we were served a greater variety of vegetables, and even pie and cake. These mountain folk know nothing of making light bread. On a few occasions when it was served to the children at school it was highly prized by them.

[5] A dearth of dishes was apparent, too, in the smaller hollow. Funds had been provided the teacher whereby she might supplement the meager lunches of the children. Frequently condensed milk was used in this preparation, and so keen became the competition among the children of the several families for the one or two empty cans available at one time that a system for their distribution had to be devised. The cans were wanted for cups at home.

lies make pumpkin butter in lieu of apple butter. The manner of cooking and the equipment used are the same.

A dozen yards down the slope in front of the cabin where we stayed for two days was a spring which supplied water for the household, and over which a little "spring house" was built, serving as the farm refrigerator. Most of the families in these mountain districts are dependent for their water supply upon springs, near which their cabins are usually built. There is but one well in even this larger and relatively prosperous hollow, and no cistern. During a prolonged dry season, as the summer and autumn of 1930, many of the springs dry up and water must be brought from greater distances, usually up a hill. A few of the springs were claimed by their owners to maintain a regular flow thru all seasons. Water works and plumbing are unknown, of course; likewise toilet facilities of any sort; and screening.

SOURCES OF CASH INCOME

The cash income in these mountain communities is decidedly meager, and naturally varies greatly among the inhabitants, according to their individual ability, resources, and industry. Logging, carried on to a limited extent, has already been mentioned. Some of the men leave the district for shorter or longer time, finding work cutting wood or building trails and roads. In apple picking season, and occasionally at other times, they may find a few weeks' employment in the Shenandoah Valley.

When other employment fails, a few men who have become proficient in the art make baskets. There is a limited sale for these articles among other mountaineers, but the chief market is of course outside the mountains. A man and his two young sons living near the little school have realized $30 from baskets made during the past winter. So far as the material is concerned, however, spring time, when the sap is running, is the most advantageous season for making the baskets. The oak saplings, of which the baskets are made, are split into strips which are then soaked in a spring branch for some days in order to soften them for weaving. These oak strips are also utilized in other ways in the household equipment—for seats in the home-made chairs, and for binding the broom corn to the handle in making brooms. These light weight, home-made brooms were in evidence in several cabins, and in one garden a few rows of broom corn still were standing.

One of the most enterprising men of the region has an orchard of a few hundred trees from which he dried about 1300 pounds of apples during the past season. In other seasons he has dried even more. This man's farm lies nearer the Piedmont than the other farms visited, and he is more accessible to a market. He sold his fruit to two country merchants whose stores are three and six miles distant from him, respectively. The store six miles away is in the Piedmont. Seven cents a pound was the price received for most of the dried fruit. Apples from another orchard even nearer the Piedmont have been, in some seasons, boxed and shipped to city markets. Only a few of the men in this mountain region are attempting to spray and prune their fruit trees, most of the product, consequently, being of an inferior class. There would seem to be opportunity for further orchard development here should the area not be taken over for the proposed park (Fig. 8).

Mountain tradition, of course, credits some income to whiskey, condensed product of the hillside corn patch. Such may be the case here. Rumor was not lacking that some of the men had interests in a still "on the Ridge." Indeed, in one home we visited, revenue officers a few months previous had found the equipment for a still under the kitchen floor. There was, moreover, evidence of at least some home consumption of this product in the district.

Effects of Isolation

The scarcity of the contacts which the people of these communities have beyond their mountains is reflected in various ways. Even in Nicholson Hollow, which boasts a road thruout its length and has received more school advantages than Corbin Hollow,[6] the people have little concern for happenings other than those directly related to their own lives. Few of the inhabitants read with a facility which enables them to obtain their news thru the medium

[6] For the past seven years or more Nicholson Hollow has had a school term each year of from three to eight months duration. One teacher scarcely qualified for fourth grade, but the others held teachers' certificates. The school equipment, however, is even less than that of the Thoroughfare Mountain school. As there is no school building, school is held in the church. This is an unsatisfactory arrangement from the standpoint of equipment and supplies as they cannot be cared for adequately or safeguarded. About five years ago the church authorities refused to give the key of the building to a young man who had been appointed to teach, because he was not of their particular religious sect. At another time they demanded the key after school had been in session for several weeks.

FIG. 8. An orchard used as pasture for cows and horses. Many of the rocks have been thrown into piles to leave more room for the grass.

of a newspaper. Thus, with neither books, papers, nor news of the world at large to occupy them, their interests are limited almost wholly to their own and neighboring communities. The people whom they know personally comprise their world. And most of these, particularly the neighbors within their own community they know very well indeed, including all their affairs. With attention so little divided it is not surprising that jealousies, misrepresentations, and distrust are met with.

Their diction includes words and expressions of a past generation. In conversation with the children at the little school it was frequently necessary to have more than one child repeat what another had said before it became intelligible to me. One day in response to an exclamation over the beauty of the mountains a little girl said, "There must ain't no mountains where you live." A fourteen-year-old girl upon seeing at school the picture of a train for the first time asked what it was. She had never seen a train. Few, if any, of the children have seen one, altho under certain atmospheric conditions, one can hear at the little school the whistle of a locomotive in the Shenandoah Valley. Some of the children in the smaller hollow have never seen an automobile.

Since practically no "new blood" comes into any given district in the mountains, relationships are quite complicated. Upon asking how three men, patrons of the little school, were related the following answer was received: "Oscar is Bailey's nephew; Oscar's wife and Bailey's wife are sisters, and are also nieces of Fennell; Fennell's wife was a sister to Bailey and to Oscar's father." On another occasion in reply to an inquiry regarding the ownership of a certain apple orchard apparently very well cared for which came into view on a distant mountain side, the mountaineer addressed answered, "Pete and Paul." In a district where most

of the inhabitants have the same last name, the use of it is more or less superfluous.

"Outside" Contacts Affect Changes

Contacts of the mountaineers with the outside world are increasing, however. Some changes have already taken place and others are creeping in. With but one exception, all the homes which we visited in the mountains were built with fire-places—chimneys of stone and mud. Yet in practically every cabin a box stove was in use at the time of our visit and the fire-place closed. The stove is not so picturesque, certainly, as the open fire, but affords far more comfort in cold weather.

Last spring one of these mountaineers, the father of several children, traded his only horse for a $10 phonograph and sixteen records. He said his children wanted it so badly. The year's crop was already planted, but the cultivation had to be done with a hoe. In a cabin in Corbin Hollow a phonograph was played proudly for us by the owners. It had been obtained in exchange for two barrels of corn and the crop of fodder.[7] Radios, too, have been introduced. Thru some philanthropist a limited number of these are now installed in certain centralized cabins in the mountains to serve the respective communities. One evening we attended a gathering of neighbors in Nicholson Hollow to listen to the radio. "Amos 'n' Andy" hold no interest for these isolated people who have practically no acquaintance with the Negro race.[8] Their choice was for a program whose subject matter knows no mountain barrier—music.

In some instances people living outside the mountains are making use of mountain land and thus introducing contacts. Farmers from the "Valley," the usual way of referring to the Shenandoah Valley, have fenced certain areas and are using them as summer pastures for cattle. We passed thru one such tract between Thoroughfare Mountain school and Nicholson Hollow. About forty-five head of cattle had been pastured here thru the summer on approximately 275 acres. Usually the cattle may be kept in the mountains until the end of October, but because all the springs had dried up and there was, consequently, no water for the cattle, they had

[7] Acute food shortage in this cabin followed a few months later.

[8] There was neither need nor wealth for slaves in the mountain section of Virginia. Nor has there been any attraction here for the free Negro.

to be taken out last fall a month early. The cattle were driven to the valley farm of their owner where they would be fed thru the winter. The parts of this tract thru which we passed had the appearance of affording very poor pasturage in even a good season. The owner of a similar tract told me that the cattle get much of their living there from the undergrowth, as much perhaps as from the grass.

Another means of outside contact which is developing in this region is thru the hikers and vacationists. In increasing numbers they are being attracted by the scenic beauty, the facilities of a nearby resort, and the construction of the Appalachian Trail.

FUTURE OUTLOOK

The future of this region may be in marked contrast to its past. The National Park Commission for several months has had men at work appraising the private property in the proposed park area as a basis for remuneration should the region actually be taken over for a federal park. Some of the mountaineers are making tentative plans for leaving their mountain homes; one family has already left. The owner of perhaps the largest holding in Nicholson Hollow hopes to be able to buy a certain Piedmont farm. His son has an offer for permanent employment with a "Valley" farmer for whom he has picked apples. One of the problems confronting the authorities in converting this region into a park is the satisfactory disposition of the people now living within the area. The mountaineers doubtless will have difficulty in adjusting themselves to other environments. One family sold their farm in Nicholson Hollow a few years ago and moved to a town in West Virginia; but they were dissatisfied and within six months had returned to the hollow and purchased another farm. Another family lived for a time in Culpeper, Virginia, but after a few months they, likewise, returned to the mountains where they have since remained.

If plans for the proposed Shenandoah Park materialize, this region should become one of the most popular national parks since it is within a two-day drive, or less, of a large percentage of the country's population. In all probability within another decade a new era will have begun in these mountains and the day of the Blue Ridge mountaineer will have passed.

THE TEACHING OF GEOGRAPHY AS A SCIENCE

W. H. HAAS
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The high educational value of geography in our schools is well recognized, but the position of geography as a science is still to be established. In fact, there are those who are firmly convinced that inherent difficulties in the subject matter and treatment may always prevent the subject from taking the rank of a major science. Much of the subject matter found in geographic literature, it is to be admitted, is not subject to quantitative measurements nor are the conclusions such that definite laws may be established from them. It is true also that textbooks in geography show little standardization in subject matter or treatment, and that there is little progressive development of the subject, making a fact definitely dependent on what has gone before. It is probably just as true also that the chief emphasis by the teacher is upon the acquisition of more or less isolated facts rather than upon the presentation of these facts from the scientific point of view in a logical order of sequence.

However just such criticism may be, it is quite certain that the general standing of geography always will be determined by its rating as a science. Much has been done in recent years to advance the subject along various lines, especially in putting it on a quantitative basis. This is particularly noticeable in the proportionally larger number of articles in our journals based on detailed quantitative mapping. Out of such work there will come ultimately also definite modes of attack, an evaluated order of material, principles and laws. In advancing the subject as a science the teacher, however, will always play a most vital part and this will come about much more rapidly if he is imbued with a sense of the value of geography as a science. To this end he needs to have clearly in mind at all times what in all fairness may be expected of him as a science teacher.

THE MEANING OF SCIENCE

As most of us are aware, the world is not divided into two sets of phenomena, scientific and non-scientific. Nature knows no such sharp distinctions or divisions, nor can they be made by man on any sound basis of classification. The entire field of human knowl-

edge and experience properly falls within the realm of science. When Taylor of "scientific management" fame worked out the most economical technique in shoveling coal, he was as truly working in the realm of science as is a Rutherford working on the structure of the atom. The American Association for the Advancement of Science, the largest and most influential scientific organization with which almost all of our scientific organizations are affiliated, recognizes this by setting aside a section also for history and the languages. The only real difference in subject matter is that some of it lends itself far more readily to scientific treatment, to the *scientific method* of solving problems. Thus the general term "science" has come to mean both subject matter and method.

The aim of all science is to become acquainted with facts and phenomena of nature, and to organize these into some unit whole thru underlying relationships. When such relationships can be measured and organized into accepted units or laws, they become stepping stones for further advances on the frontiers of human knowledge. Some of the older sciences have done much with organizing the subject into orderly form, and in the development of a definite terminology, laws and principles, and consequently have an enviable standing. Others, altho centuries old, have been less fortunate and advanced little. It does not follow, however, that subject matter taken from any of the well-established fields is necessarily scientific. Thus to publish a list of the plants of a region, using scientific names, does not make the author a botanist necessarily, nor the publication scientific. To write up a complete story of the tagua nut—From Nuts to Buttons—does not make the author a geographer nor the publication scientific.

Also it does not follow that because the subject matter is of recognized scientific value that the teaching of it is necessarily scientific. It is even possible that a teacher in one of the well-established sciences may be far less scientific in his teaching than the language teacher in an adjoining room. The latter even may inspire more scientific interest and infect his students with a deeper scientific spirit than the former. Even the teacher who is fully conscious of the need of presenting his material from a scientific point of view does not always do so. There is the press of time, the need of drill, the preparation for a coming examination, or something else that leads him away from the major consideration. Such lapses may be necessary and perfectly legitimate, but it must be recog-

nized that because one is teaching in a recognized scientific field it does not follow as a matter of necessity that he is teaching science.

The Scientific Method

The scientific method of solving problems is not difficult to comprehend or master, nor is it some new invention for correct thinking. The child in its crude way has it when it asks its numerous tho unorganized questions. The primitive man when he experiments with various methods of capturing his prey, is a scientist in his way. The Egyptians, Chaldeans, and Greeks had the method highly developed. However with the decadence, to a large extent disappearance, of these cultures and the advent of Christian beliefs, which emphasized spiritual rather than material riches and the unquestioned acceptance of dogma rather than individual thinking, the mind seemed to have lost its desire to search for truth. This attitude is well illustrated by Bishop Usher's decree, thinking to settle for all time the question of the origin of the earth by fixing the date of its creation at 4004 B.C.

However, about the time of the discovery of America not only much progress in thinking had been made but also a new spirit had started. A working and merchant class was accumulating property and with it came independence of thought, a testing of conclusions, the Period of Renaissance. With this growing independence of thinking, the old-time questions of how many angels can dance on the point of a needle or why does a live fish in a bucket of water weigh more than a dead one disappeared as the new point of view made such questions obsolete. Out of all this grew the modern period of experimentation to test truths, and that which characterizes the present period above all others is its use of marvelously delicate precision instruments for quantitative measurements. Any science to be worthy its name must be able to test its conclusions and to a degree do it quantitatively and in great detail.

The scientific method of attack is a simple search for the truth, using certain more or less definite steps in the process. (1) There is the observation of fact and phenomena. (2) These are analyzed into their constituent parts and their relations noted. (3) This material is then classified and organized into related whole or wholes. (4) Conclusions are then drawn and theories advanced. (5) These conclusions are tested for the purpose of either rejecting

or confirming. (6) To this may be added that if the conclusions stand all tests they then become the stepping stones for further advances. Another and briefer statement is (1) observation, (2) analysis, (3) hypothesis, (4) deduction, and (5) verification.

The importance of the method of attack in science cannot be over-emphasized. It is more important in advancing truth among men than the conclusions reached. To some, it may seem strange that a false theory thus established may be more helpful to man's thinking at a certain period in the history of science than the true one impossible to verify since the supporting facts then are unknown; and yet this is unquestionably the case. There have been many cases of this kind and all have aided rather than retarded the progress in the search for truth. This has been especially true in the nebular hypothesis which held sway for so many years because Laplace had put forth such a masterpiece of scientific exposition. Altho untrue, at least in large part because of false premises, it accomplished its purpose for the time being. When the world was ready to test another hypothesis then came the planetesimal which cannot even now be accepted in its entirety. Yet in spite of this, it already has revolutionized many of our conceptions in astronomy and geology. That the final word has been spoken as to the origin of the earth of course is absurd, yet much of our thinking is determined by the view held. This principle crudely stated holds true in thousands of cases in all of our sciences. Conclusions reached become handles with which to grasp other data for building new structures. The ultimate solutions of things is a real will-o'-the-wisp.

The purpose of the scientific method of research is to discover order in nature. Because of the universal acceptance of law and orderliness in the universe, the discovery of a reasonable order in any branch of knowledge is accepted as explaining that phenomena. This may be done in a variety of ways. For example, to be able to identify a certain fossil as the thigh bone of *Homo sapiens* is a scientific explanation for that particular specimen. Likewise to speak of Indianapolis as an inland city is a scientific explanation, provided, of course, that there is a more or less accepted scientific classification of cities into which this fits. If, on the other hand, cities cannot be classified as to their origin and development due to some underlying cause, then the word "inland" is purely descriptive and scientifically meaningless.

Again, to place in the proper order of a series is to explain. To find a skull of a primitive horse and to be able to place it in its proper order in respect to the evolutionary series of the horse is a scientific explanation of that skull. This is accepted as an explanation because we have become satisfied that there are definite progressive stages in the evolution of the horse. Similarly, to speak of certain peoples as being in the hunting or any other stage is a scientific explanation, provided again we generally accept such definite stages in the development of peoples. If, on the other hand, there is no generally accepted natural evolution from one stage into another, then the term hunting is scientifically meaningless as an explanation. To speak of the American Indians as a brave people is purely descriptive and not a scientific statement.

Another scientific explanation is thru mediates. No one has ever seen the rods and cones of the retina of the eye vibrate and thus send their message thru the optic nerve to the brain. We accept this explanation of the way we see because the facts upon which this theory is based seem reasonable for it fits in with what we know and have proved in other fields. We cannot pass in review all the factors active in Montana the past ten years or more that have caused this state to stand out as the only one in the Union showing a definite decrease in population from 1920 to 1930. Some one, however, may satisfy our scientific curiosity on this by thinking of possible causes effective elsewhere to this end, and apply some of these to the conditions which seem to have been most prominent during the past decade. If he selects his premises well and thinks logically we accept his explanation as the one answer. To us it is a scientific explanation until some one else proves that another conclusion is more logical.

Probably the most common of all scientific explanations is referring to accepted laws. Thus we may explain the cause, the velocity, and the direction of the wind by speaking of the air as pulled down the barometric gradient by gravity. In this respect geography is particularly weak as it has few if any laws widely accepted as such. Modern geography is still so young that perhaps we have little right to expect much in the form of actual laws. Yet geography must develop laws if it wishes to grow as a science and if it wishes to stand well among other sciences. We are acquainted with the definiteness of physics and chemistry because of the fundamental laws which govern. The teacher of physics or chemistry

can explain many phenomena readily and quickly by referring to some law. The social science group has developed few laws and the teacher is deprived, very largely, of this method of explanation. Even in geology to which geography is, perhaps, most closely related, there are definite laws—especially is this true of petrology, mineralogy, and paleontology, usually considered as a part of geology. The lack of established laws is a real handicap to the teacher for it fails to provide him with definite and brief explanations.

Enough examples have been given, it seems, to show that modern science does not attempt to explain things *per se*. It disclaims that ability. It confines its task to placing, to relating, to referring. Modern science emphasizes particularly *how* things happen, not *why* they happen, how certain results are brought about, not *why*. An explanation of the *why* merely demands another *why*. The interest is not *why* an apple falls from the tree, but *how* does it fall. In geography it is less of a question *why* New York is our leading seaport than *how* has it become what it is, what are the forces that make it so.

But science must have other characteristics than the method of handling material or the mere allocation of subject matter. It must develop laws and principles instead of only technical terminologies. There must be a consensus of opinion about methods and principles to be used in the development of the subject. There must be definite limits to the material which rightfully may be included within its field. There must be developing a technique in the collection and handling of its data. Words must take on definite meanings and not be mere haphazard suggestions interpreted differently by different people. In passing the field of geography in rapid review it must be admitted, quite readily, that the teacher is much handicapped when he definitely attempts to teach the subject as a standard science. To teach geography as a science well, therefore, requires a teacher of unusual ability.

CONCLUSIONS

In conclusion it may be permissible to summarize the outstanding things on teaching geography as a science, in relation to subject matter and method. If the purpose of all scientific research is to find orderliness in nature, then the one serious function of the science teacher must be to acquaint his students with that order.

This sense of orderliness does not come with a presentation of merely informative facts. Isolated facts, no matter how valuable for certain purposes, cannot make a science. Such material must be looked upon merely as the building material from which a scientific structure is to arise. A lesson on cacao, for example, how it is planted, the bearing age, the harvesting, drying, and other preparations necessary before the crop can be marketed, may be interesting, very informative, but not necessarily scientific. The facts about cacao may have been acquired as are declensions or conjugations. It may be necessary to present isolated material as a background for geographic study, but there must be no misconception by the teacher that this is science teaching. Science is more than informative, it is interpretive.

As the chief purpose of all scientific study is to find the orderliness of nature, so also must every approach to a scientific problem be orderly. This is the significance of the word scientific in scientific method, scientific management, and the like. It is the very opposite of haphazard. It means orderly thinking and reasoning. To present a certain conclusion from the text and then ask the student *why* can scarcely be considered a scientific approach to the question when the answer can only be a haphazard guess. This procedure may be necessary or even advisable under certain circumstances, but it must be recognized that haphazard guessing to another's query is not a scientific way in approaching a problem. Whatever the method used in teaching, the complete relationships must be built into a unit whole. Thus to learn to think clearly and logically from sound premises to a definite conclusion is the greatest asset that can come to any young student thru the study of science. Geography as a science of interrelationships is particularly well fitted for this when in the hands of a skillful teacher.

A SIMPLE KEY TO SOIL GEOGRAPHY

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AN ANALOGY

Flung in bold relief across the base of the Italian peninsula, the Alpine mountains stand a cumbersome barrier to communication between Italy and central Europe. But how easy it is to travel from the Florida peninsula into southeastern North America. The smooth, level plains make the movement of wagon, auto or train almost effortless.

The simple geographic relations just set forth are very easy to discover and understand. One can readily appreciate how the steep declivity of the mountain sides hinders locomotion, while the level surface of the southern Coastal Plains offers as nearly perfect a compromise with gravity as transportation by land can hope to effect.

Now seek to understand and *feel* the precise way in which two unlike soils express their bearing upon man's conduct or activities. The average geographic treatise states vaguely that one soil is "favorable" while the other is "unfavorable," or that one is "good" and the other "poor," or that one is "sandy" and the other "clayey," or that one is "residual" and the other "transported," and that is supposed to settle it. But is your curiosity really satisfied? Had you known nothing about the Alps, would you have been content to have been told merely that they comprise a topographic feature which is "unfavorable" while the Florida district presents "favorable" conditions to transportation? You might have just as reasonably thought that the Alps are a great, high plateau or rugged hills, or even a much dissected plain. Even knowing they are mountains is not fully satisfying, for some mountains, such as the Urals, are only inconsequential barriers.

It is obvious that to understand and truly evaluate an object one must know its properties or characteristics and the manner in which each functions. Mere qualitative relationships—rich, poor, good, etc.—are vague and deceptive and neither give your auditor the opportunity to sense the relationship or to check your judgment. In climatic and topographic analyses we usually take care to state the properties or features involved, sometimes in great

detail, but soils are such mysterious entities to the non-technician that he veils his characterizations in obscure if not non-committal terms. Yet soils are as easy to understand as the more familiar environmental elements.

Soil Texture

Perhaps the most familiar property of soils is their texture. Texture refers to the *proportion* of sand, silt and clay making up the soil mass. When the proportion of sand is high, the soil is designated as a sand or sandy loam: similarly in the case of silt and clay. Then, if sandy, the soil is immediately, but illogically, qualified as "poor" and if a clay loam, as tough and undesirable. Yet sandy soils are unsurpassed for potatoes and melons, and the great sugar crop of Cuba is almost wholly a product of clay soils!

The limitation of thus qualifying soils as poor or good becomes evident if the technique is applied to another field. Suppose I should try to characterize a building for you in comparable terms. The building of which I am thinking is largely made of stone and the balance is metal and wood. What is the building? Is it a good or a poor building? What is it good for? Would you buy it for a summer home? The price is only a thousand dollars. But you would not buy it. Why not? Still, the facts given are comparable to those usually deemed of fundamental importance in soil evaluation.

It is evident that the way the materials are put together is of far greater importance than their proportion. Should I add that my building was erected in the form of a church, a factory, a school or a bungalow, I would tell you something infinitely more important about it. Eventually, of course, we would come down to the question of size and nature of material, that is, whether large stones or small, whether limestone or marble, etc.

In soils, the arrangement of the material is also of greater importance than its textural composition, especially when the soil is fine in texture. A soil is useful chiefly to the extent that it is suitable for the occupation of normal plant life and will lend itself to easy cultivation. It should be so built or constituted that roots, air and water penetrate it with comparative facility and that the soil mass falls apart readily when turned in plowing. Lacking this property, plants establish themselves with difficulty, and the soils are hard to plow and harrow.

SANDY SOILS: GOOD SOILS

Measured by such requirements, sandy soils are "good" soils. The individual soil grains are large and relatively non-cohesive, so that roots, air and water have no difficulty in penetrating the soil mass. Sandy soils are also easy to cultivate as the sand grains fall apart forming loose mellow seed beds.

FIG. 1. A young corn field in eastern Nebraska. The soil is a silt loam, composed largely of the finer soil grains, but note its excellent physical condition. When cultivated, the soil mass fell apart readily forming small, easily pulverized lumps. This feature is possessed by most of the soils of the Corn Belt and has greatly facilitated the extensive use of machinery.

It is the popular belief that fine-textured soils—i.e., clay loams, clay, etc.—display the opposite characteristics. While true in the case of certain soils, it is far from stating the significant relationships. Under natural conditions, most fine textured soils possess what soil scientists term structure. This signifies that the individual soil grains—the sand, silt and clay particles—stick to one another and form larger aggregates. The aggregates vary a great deal in size, depending upon the soil in question. The important thing, however, is not the size but the fact that the aggregates function like huge sand grains. The spaces between the aggregates furnish passageways for roots, air and water. And when plowed, the soil material falls apart, breaking along the spaces formed between the cohering aggregates. Figure 1.

When fine-textured soils are brought under cultivation, however, the structure aggregates are more or less subject to disruption. Some crumble very readily, altho others are well knit and highly cohesive. Those of unstable, crumbly structure are plainly the "poorer" soils. Plants find them hard to penetrate. They become sticky and wet after rains, since the broken down, powdery mass destroys the soils' porosity and obstructs the ready downward movement of water. In periods of low rainfall, the soils dry out and crack open as the absence of natural lines of cleavage between aggregates cause the shrinking soil mass to break irregularly.

Soil Structure and Climate

Unfortunately, soil literature does not consistently report or always very carefully describe the nature and resistivity of the structure aggregates. It will eventually do so, but in the meanwhile a rule of thumb index will prove very convenient. Such an index is furnished by the climatic conditions prevailing in the region the soil occupies. Obviously, the exact status of any soil can be determined only by direct examination, but in lieu of such opportunity or the lack of data, the climate will help to roughly measure the mean or normal circumstance.

Fig. 2. A vertical exposure or cross section of one of the sandy soils of the Delaware Coastal Plain. The average sand grain here is rather small, so that the mass is cohesive and stands up quite vertically, but observe that the grains do not cohere to form larger aggregates as in the case of the silt loam shown in Figure 1. Yet the sand grains separate readily allowing the penetrating of roots, air, and water, and making cultivation easy.

A well-knit structure is dependent upon the presence of certain chemical conditions in the soil, especially upon the presence of the so-called alkalis and alkaline earths:[1] reduce or remove them and the structure weakens proportionately. Plainly in regions of high rainfall, roughly greater than 25 to 30 inches, these constituents are more or less absent. The heavy rainfall penetrates the soil mass, takes them up in solution, and removes most of them in the drainage waters. Naturally the opposite maintains in regions of low rainfall. Here the soil masses are well knit. They change somewhat under cultivation, but the soils seem to retain a good physical status almost indefinitely.[2]

[1] Calcium, magnesium, potassium, etc.

[2] Arid soils gradually lose their virgin structural forms but acquire others in their place of nearly equal efficiency.

The rate at which the aggregates of soils of humid regions break down varies considerably with different soils. Most soils can carry at least a crop or two, and some can be kept in good physical conditions for years after clearing. The latter is particularly true of the normal soils of the cooler rainy climates such as those prevailing in western Europe or the northeastern part of the United States. The lower temperatures of such regions prevent the soils from being as thoroly leached as the average soil of the hot, rainy tropics, so that the constituents necessary to keep the soil grains cohesive are present in greater proportion, and the structure aggregates are rather durable. This does not mean that the aggregates will not break down eventually: unless properly managed they will break down in rather short order. They are weaker than the aggregates of non-humid soils, but when compared with those of other humid climates, they are fairly strong and capable of furnishing the basis for maintaining the soils under cultivation indefinitely. At the opposite end of the scale are the old soils of the hot, wet tropics. These are so thoroly leached of their structure-maintenance constituents, that they stand up but a few years when cultivated. Between these extremes, there are naturally many soils in various states of structure resistivity.

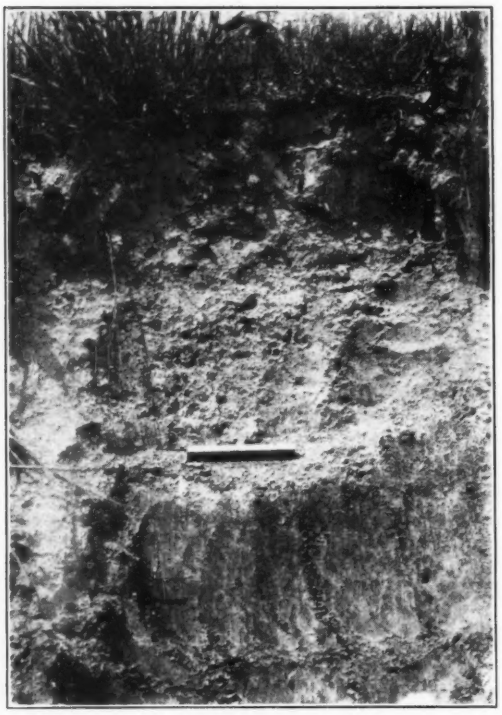

FIG. 3. A vertical exposure or cross section of a clay textured soil in southern Illinois. Note especially the soil materal about the six inch ruler where the soil grains adhere to form larger lumps or structure aggregates. Such a soil is said to have good structure. Below the ruler, the soil material is not only finer in texture but also lacks good structure: here the soil material forms more or less irregular chunks when turned in plowing or spading, and the chunks are gummy when wet or form hard lumps when dry.

Obviously other factors than climate also influence the char-

acter of a soil's structure. Differences in parent material, in topographic position, in natural vegetation, and in state of development must also be taken into account. Parent materials high in alkalis and alkaline earths would, as a rule, tend to make soils of better structure than formations low in such constituents. On the other hand, given time enough, climate tends to reduce even such inequalities to a common level by successively removing the greater supply of structure maintenance materials. Similarly soils occupying slopes would tend to have a better structure than soils of adjacent level uplands derived from the same formation. The slopeland soils, being continually subject to erosion,[3] are always losing their leached top layers, so that the fresher, unleached substructure is brought to the surface, keeping the soil rejuvenated, so to speak. Yet climate continues to hammer away at the new materials, striving to reduce them to the level of the upland soils. A similar reduction tends to be effected where local differences in natural vegetation bring about differences in soil structure. All such factors are local or secondary, however, and climate stands forth as the dominant key to the general character of soil structure.

Soil Fertility

Granted suitable occupancy, the next important consideration is one of sustenance, i.e., the soil's content of plant food. Here too climate furnishes the master key. Manifestly, in regions of high rainfall and hot temperature, mineral and organic decomposition proceed very rapidly, and the normal soils are speedily impoverished of their plant foods by the tons of water annually dumped upon them. The water enters the soil and for centuries has been taking up in solution the precious plant foods and carrying them downward beyond the plants' reach if not into the drainage waters and so into the sea. In contrast are the soils of desert regions. There the rainfall is so light that it dissolves but little, penetrates to only shallow depths, and there lays down its burden. Between these two extremes is a complete gamut, representing many states and degrees of leaching. In other words, climate, as in the case of the soil's physical status, is also an index to its general chemical condition.

[3] Erosion of slopelands takes place even when the surface is clothed with vegetation under natural conditions, altho the rate is fractional to that effected when soils are cultivated.

SOIL DERIVATION VS. SOIL EVOLUTION

The relationships just stated are highly significant. Heretofore we have given much attention to the soil's origin, to the sort of formation giving rise to the soil's materials and to its method of formation or accumulation. We have been much concerned as to whether a soil in question came from limestone or sandstone, or whether it was transported material brought in by wind, water or ice. But of what fundamental value is this information from the functional point of view? What matters it, except in a secondary way, whether the material in our building came from a clay bank, as brick or tile, or from a stone quarry, whether it was hauled from its place of production by rail or truck, or whether it was used on the spot, as long as we know that it was fashioned into a well built or a poorly built house or factory. Such considerations are secondary, not primary. Regardless of what it is made, one has little use for a building unless it is constructed to fill one's needs. The aptitude of the workers and what they build is of far greater basic importance than the materials they work with. Give a log apiece to a Swiss wood carver, to a Polynesian boatman and to a Canadian frontiersman, and behold how different their products. So given loess, the humid subtropic climate of Mississippi makes weak-structured, impoverished yellow soils; the cool, rainy climate of Illinois makes fair-structured moderately leached brownish soils; and the sub-humid climate of Nebraska makes strong-structured, rich black earths therefrom.

Or very different materials may be made into very similar entities. Give church architects stone, brick, wood, or steel and they will fashion them all into edifices of worship, not precisely alike necessarily, but all capable of accommodating religious services. So also in the case of climate and soils. The sub-humid climate makes black earths from glacial drift, shale, limestone and sandstone as well as of loess. The soils differ in detail, but like the stone or wooden church, they are useful for the same general purposes.

THE IMPORTANCE OF PHYSICAL CONSTITUTION

The average person thinks that a soil's supply of plant food is its most important property. He expresses much concern as to its richness or poverty in fertility constitutents. If a soil is low in such materials as potash, nitrogen or phosphorus he regards it as poor and of low value. Let us examine this point of view.

It so happens that most geographic elements have two kinds of

properties, one of which is relatively stable and not easily changed, while the other is comparatively pliable and readily modified. A mountain chain, for example, is a fixed, permanent barrier: we have not the biblical faith to move it so it stands an unalterable obstruction to transportation. This fixed feature, therefore, constitutes what we may call the point of departure; it must be taken into account in all our reckonings in mountain geography. On the other hand, we can choose characteristics of the mountain which by judicious combinations and alterations here and there (such as selecting a proper combination of valleys and passes and grading the slopes) will alleviate the general obstructiveness of the barrier to a considerable extent.

In soils, the barrier or basic feature is their physical constitution. It represents a fixed, unchangeable fact. There is virtually no easy way known to modify it, particularly where large areas are concerned. Imagine the problem of changing a thousand square miles of sticky gummy clay to a loose friable condition! Except for a garden spot now and then, the world's sandy soils will remain sandy soils, and the poor structured soils will remain relatively poor structured soils during all time with which we shall ever be concerned. We might just as well try to change a stunted gnarled tree to one of robust character and straight wood. We may be able to effect some alteration but the tree will still be fundamentally a weakling and show its cross grained fibers.

Granted a good constitution, however (i.e., a sandy soil, or one of good structure), the plant food deficiency can be made up by the mere addition of the proper materials, viz., fertilizers. This is the soil's flexible or modified feature. Were I to buy a piece of land blindly and knew nothing more about it than that it lay level and within reasonable distance of a market, I would sooner know that it possessed a favorable physical constitution than that it was well supplied with plant foods. Of course the ideal soil is one in which both conditions are favorable. Yet if a house is well built, it can be made thoroly liveable by bringing in food and furniture, but if poorly built and of crumbly walls, it gives but scant comfort and is soon abandoned.

Conclusions

Reduced to such simple terms soils become as readily comprehensible even to children as the more familiar climatic, topographic or vegetative environment. Anyone can readily grasp the idea of a soil's habitability—whether constitutionally it is a sand whose

grains separate readily for plant occupancy, or a soil with good, well-knit structure aggregates which act like giant sand grains, or a soil of poorly-knit, crumbly structure which soon breaks down when loaded with crops. The question of plant foods is equally simple. Excellent is the soil that has both a good house for the plant to live in and a well filled larder. Lacking nutriments, the world's storehouses have on hand enormous reserves of just the foods the plant requires. Whether the husbandman finds it more profitable to go and buy, or to use the naturally richer soils is chiefly a matter of economics. If he can produce a crop of special value to which he can append the price of his fertilizers, he can afford to buy them; if not, he usually goes to better land or sinks to a more or less subsistence level after he has depleted the soil of its small supply of original food.

Suppose, however, that the soil surveys or other publications do not clearly or fully describe the structural characteristics of your fine textured soils or the nature of their food supply. Then turn to your climatic map rather than to one showing geologic formations. The latter might well be in your possession too but its implications should be carefully seasoned with the salt of modern pedology, as soil science is now called. Here is an average tropic plain with an all-year rainfall. What is important about its soils? Its sandy soils are in all likelihood very low in plant foods, but they will respond to fertilizers if it pays to use them, for the soils are physically tractable. And the fine textured soils, such as the silt loams or clay loams? Unless exceptional or local conditions obtain, they are most likely soils with a poorly-knit structure which breaks down rapidly under cultivation and with a supply of plant food so low that a few years' cropping exhausts it. Hence the agriculture of the inhabitants is likely to be a nomadic one if they are not able to use fertilizers. Elsewhere is a cool, sub-humid plain like that of North Dakota. Its soils should have a well-knit structure and be well supplied with plant foods. In fact, such soils are of the black earth variety, the world's best and most fertile soils.

Finally, the use of descriptive terms which characterize a soil's structure and indicate its plant food relations has a real, comprehensible meaning. Such terms convey much more than the vague designations of rich and poor or residual and transported—qualifications which tell nothing directly important about the soil and leave the mind wondering and confused.

MAP READING BY AVIATORS

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It may interest teachers of geography and their pupils to know that American aviators were dependent upon French maps in carrying out aviation activities during the World War.

French maps included chateau markings, churches in villages, important shrines, mills (water power), fortifications, national boundaries, department boundaries, cities, towns, villages, forts, mountains, forests, rivers, important streams, woods, lakes, farms, roads surfaced (principal and secondary), roads not regularly resurfaced, dirt roads, standard gauge railroads, double tracks, stations, stops, tunnels, single tracks, narrow gauge railroads, canals, and streams.

Maps were placed in glass-covered rectangular boxes, fastened at convenient points in cockpits, with controls at the sides, making it possible to rotate the maps forward or backward according to the immediate territory over which the pilots were flying. An operations order for flight included the time, place, and elevation of rendezvous. From this point the formation would fly from point to point during the required time, in an attempt to carry out the objective assigned. One can readily see the importance of an understanding of map reading in such assignments to aviators. Each pilot was obliged not only to watch his plane, his place in formation, the elevation, time, gas and oil supply, his machine guns, and the enemy, but he was to fly over the prescribed territory called for by checking what he saw below with the map before him.

A veteran pilot* states:

> On the maps supplied by the French the outline of the forest was very clearly defined. This is also applied to many bodies of water. Very frequently I have been completely lost and have suddenly discovered a patch of woods. The outline of most woods is very irregular and looks much like a piece of a puzzle picture. It was always a very simple matter for me, after getting a clear picture of the woods in my mind, to look over the map and immediately find the piece of woods I was looking for.
>
> Railroads were always confusing to me and on long trips, particularly at the Front, I relied on the Marne and the Meuse to get me safely home. There are usually railroad tracks along every river, so I never found them of much use in locating my position in relation to the river.
>
> The showing of villages on aviation maps was always more confusing to me than

* Former First Lieut. Alden Sherry, of the 94th Pursuit Squadron, now residing in Syracuse, N.Y.

anything else. Of course, France, where they are so close together, can hardly be compared to certain sections of our country where they are more spread out.

Contour maps, showing the elevations of the country, I should think are unnecessary. It is almost impossible in the air, except in the late afternoon, when the sun is throwing a shadow, to look down and distinguish the side of a hill from a flat meadow.

Although I have been hopelessly confused after scraps and after flying above low-lying clouds, I can recall being lost only once and that was just after I was learning to fly at Tours. I think this was due solely to the fact that I relied almost entirely on the main roads, bodies of water, and the woods to guide me.

The photographic division of the Air Service furnished aviators with views of marked sections of maps, taken from a fixed mean altitude. This picture is one of a series taken along the Moselle River, in the vicinity of Hatzenport, a small town in the government district of Coblenz, in western Prussia. It is illustrative of the value of intimate knowledge of river courses as travel guides to the aviator. It also gives evidence of the rich geographic panorama afforded by air travel. Photo by U. S. Army Air Corps.

The last paragraph indicates that there was another quality an aviator had to acquire. The French knew that conditions on the Front demanded flying under trying atmospheric conditions. Fog and rain must not hinder flying. A sense of direction must be acquired. Maps may aid, but they will not guarantee return to the home airdrome. Even if a pilot could fly with a map, he had to be acquainted with outstanding landmarks, so that if he had but a glimpse of such points, he would know his position.

You will note that the World War aërial photograph not only gives one a view of the river, railroad, terraced vineyards, forests, fields, and roads, but the arrow pointing north is a very important matter to the aviator.

The wartime pilot continues:

> The amazing thing to me was that only two men of our group were lost. One of these men landed in Switzerland and the other came down about five miles from the Swiss frontier. I recall three German aviators were completely lost. Why our boys, who had far less experience, did not land on German airdromes, I don't know. We seemed to be able to get back like homing pigeons.

An example of what an exact student of maps was able to accomplish is brought out in the following account. In the fall of 1918 a heavy rain was reported one morning all along the Western Front. Word was received that an enemy balloon was causing trouble on the St. Mihiel sector. A lone pilot volunteered to down the balloon. When the position of the balloon was pointed out on the map prior to the flight, he said he was acquainted with the position. His plane dipped slightly, but he bounded off and was circling the field. By the sound of the motor the ground crew heard him strike for the lines. They waited. They used flares when they heard his motor again. He was cited in general orders the next day for having made the only flight on all fronts in Europe and had gained his objective.

The enemy was as fully prepared with maps. Night bombers moved over definite courses at surprisingly low altitudes as far as Paris and returned for fuel and bombs only to retrace their course, and they continued until the early hours of the morning. Zeppelins and later bombing planes flew over England, and their bombing was rather exact. After the Armistice the writer examined abandoned quarters of the Germans near Longwy, within walking distance of the Belgian border. The floor was covered with maps containing fully as much information as those used by the Allies. This former operations office held aërial photographs that indicated their intimate knowledge of the territory on this front.

It is true that the content of this paper is based on a war setting, but it may enlighten some readers relative to the importance of map study by aviators during that unfortunate period. Is it not true that the present peaceful activities of citizens demand a new and more exact understanding of the value and use of maps?

MEASURING RESULTS IN GEOGRAPHY

FREDA LANCASTER
Public Schools, Fort Wayne, Indiana

It is a significant fact that there are available at present no standardized tests satisfactory for measuring the geographic achievement of elementary school children at the various grade levels. The change in the content of geography is very recent and many old habits of teaching are still recognized when it comes to making tests. It is much simpler to ask for isolated facts than to test understandings of geographic relationships. In our school system we felt that giving tests which label mere facts as minimum essentials would delay advocated improvements. On the other hand, we hoped to improve our geography teaching thru encouraging teachers to put emphasis on relationships, which are the real essentials of the subject at hand. Therefore, in order to have standards for judging and improving the quality of instruction in elementary geography in the Fort Wayne schools we constructed our own tests which were given and checked by the Bureau of Tests and Measurements.

REQUIREMENTS OF GOOD GEOGRAPHY TESTS

To make tests based on geographic principles it is essential first of all to have a definite knowledge of the outstanding relationships of the various teaching units. The directions must be worded to prevent, so far as possible, any misunderstanding. The form of answer required should aim at maximum thinking and minimum writing. Moreover, the answer required should be so definite that there may be no doubt in the mind of a careful marker as to whether the answer be right or wrong. Many devices may be used.

ILLUSTRATIONS FROM OUR FIFTH GRADE TESTS

1. Place a cross before any reasons given below which help to explain why logging is carried on in western Washington and Oregon.

X 1. There are many large trees of soft wood growing close together.
X 2. Rainfall is plentiful all the time.
___ 3. The trees are green all the year.
X 4. There are close markets where lumber can be sold.
___ 5. Many scattered hard-wood trees are found in the Congo Region.

The question emphasizes geographic relationships but involves a knowledge of specific facts. Altho the trees are green all the year,

any child who checks this statement does not understand the relationships between logging and environmental conditions. It is true that there are many scattered hardwood trees in forests along the Congo River but this fact bears no relationship to logging in Washington and Oregon.

2. Place a cross before any words or groups of words that make you think of New England farms.

X 1. Using most of the land for hay, oats and pasture lands.
X 2. Cutting corn while it is still green.
___ 3. Growing many vegetables during the winter.
___ 4. Raising cotton for New England factories.
X 5. Growing cranberries in marshes of Cape Cod.

Again, any child who checks statement 3 or 4 lacks an understanding of relationships between farming and natural environment in New England.

3. Play that you work with a gang of men who harvest wheat for a living.
   a. Place a (1) before the name of the state in which you would go earliest in the summer to cut wheat.
   b. Place a (2) before the state in which you would harvest wheat latest in the summer.

2 Minnesota
1 Missouri
___ Iowa

Exercise 3 was given to test the child's working knowledge of latitude. Note that location facts are necessary but those facts are used in relation to man's activity.

Using the same idea one might make tests involving some reasons why dairying is so important in New England, why grazing is the chief work in the plains, just east of the Rockies, why Chicago is the world's chief meat packing city, etc.

Matching Device

4. List 1 below contains several kinds of work carried on in western United States. List 2 contains some reasons why these kinds of work are carried on.
In the blank before each kind of work write the number taken from list 2 which shows some reasons for the kind of work done in that place.

List 1.

5 Working at logging and lumbering in forests.
6 Raising dairy cattle, hay, grass, berries, oats and potatoes.
3 Catching and canning salmon.
1 Raising grapes, raisins, olives, figs, and orange trees.
2 Working in hotels and acting as guides.
4 Mining copper ore.

List 2.

1. Hot dry summers, scant rainfall coming largely in winter, long growing season with rare frost.
2. Mountains, lakes, canyons, geysers and hot springs.
3. Many fish living in cool salt water, many streams leading to places where fish lay their eggs.
4. Ores present in amounts large enough to mine.
5. Many trees growing on well-watered mountain slopes.
6. Cool, rainy summers, mild winters, fertile valley soils.

Imperfect Matching Device

5. In the space before each paragraph put the number of the city whose growth the paragraph helps to explain.

1. Pittsburgh	2. Detroit	3. Portland
4. Chicago	5. Atlanta	6. New Orleans

4 It is located in the central lowland at the southern end of Lake Michigan. Railroads which connect the northeastern part of the United States with the northwestern part have to pass around the southern end of Lake Michigan. These facts have helped to make this city a great railroad center. It leads all cities in meat packing and the making of farm machinery.

1 Its location on the Ohio River in the center of America's most important coal field where there is plenty of limestone and where iron ore may be cheaply obtained from the Lake Superior region has helped this city to become a leading iron and steel city.

5 Its location at the southern end of the Appalachians has made it a great railroad center, since there are no gaps or passes thru the mountains for several hundred miles north of it. Since it is in the center of an important cotton growing district it makes cotton cloth and cotton seed oil.

3 Ocean vessels can go up the Columbia and Willamette rivers to this city. Its location near regions that produce large amounts of wheat, oats, fruit, and lumber has helped it to grow.

True-False Type

6. Write (T) before each statement that is true; write (F) before each statement that is false.

T (1) The importance of drying fruits in California is partly explained by the hot, dry summers found there.

F (2) Smelting copper is carried on in Arizona chiefly because of the high mountains

F (3) Most of the iron mines in Minnesota are open pit mines because the winters are very cold there.

T (4) Grazing is the main kind of work in the land just east of the Rockies partly because grass grows well in a region where there is too little rain for crops.

T (5) Wheat grows farther west in the United States than corn chiefly because wheat grows better in a region of little rain than corn.

F (6) Winter wheat is one of the chief crops in northern Minnesota where the winters are very long and cold.

F (7) New England farms supply most of the raw materials for New England factories.

T (8) Florida grows little cotton partly because of its fall rains and poor sandy soils.

T (9) Many factories in the west burn petroleum as a fuel partly because there are many oil wells in the west and partly because there is almost no high grade coal there.

T (10) Many railroad routes of the west follow the valleys of streams.

To correctly judge these statements one must have a knowledge of associated geographical facts. For example, Arizona has high mountains but that fact does not help to explain why copper is mined in that state.

The information gained from our Fifth Grade Tests gives objective proof of (1) the extent to which our teachers had emphasized geographic relationships and (2) the need for reteaching certain understandings. Teachers have shown an interest in creating tests which emphasize geographic relationships.

EIGHTEENTH ANNUAL MEETING OF THE NATIONAL COUNCIL OF GEOGRAPHY TEACHERS

The annual meeting of the National Council of Geography Teachers will be held at State Normal College, Ypsilanti, Michigan, on Monday and Tuesday, December 28 and 29, 1931. Members of the National Council and their friends and all who are interested in geography are invited to be present at all sessions beginning at 9:30 A.M. Monday, December 28. The Charles McKenny Hall, recently completed, furnishes exceptional accommodations for the meetings and for dining service. Hotel accommodations and rooms in private homes near the campus are available. The program represents intensive work during the year by a number of committees. The program follows.

PROGRAM

Monday, December 28, 9:30-12:00 A.M.

Greetings.....President Charles McKenny
State Normal College, Ypsilanti, Michigan

Response.....Robert M. Brown
Rhode Island College for Teachers

The Elementary School Curriculum

Developing a Science of Teaching Geography.....Edith P. Parker
School of Education, University of Chicago

Application of Principles in Curriculum Making in Geography.....Zoe A. Thralls
Department of Education, University of Pittsburgh

Outcomes of Geography Teaching in the Elementary Grades.....Marguerite Uttley
State Teachers College, Cedar Falls, Iowa

Discussion

Monday, December 28, 2:00-4:30 P.M.

Junior and Senior High School Curricula

Geography in the Junior High School.....Marie Graham
State Teachers College, Indiana, Pennsylvania

Status of Geography in the Senior High School.....Clare Symonds
Senior High School, Quincy, Illinois

Geography in the Senior High School.....Alice Foster
University High School, University of Chicago

Geography Content of So-called Fusion Courses.....De Forest Stull
Teachers College, Columbia University

Discussion

Monday, December 28, 8:00 P.M.

Geography Out-of-Doors

Field Work for College Students.....Kenneth C. McMurry
University of Michigan

Reconnaissance Field Studies for Teachers.....Robert G. Buzzard
Illinois State Normal University

Geography as a Basis for European Travel.....Samuel Van Valkenburg
College of the City of Detroit

Tuesday, December 29, 9:00-12:00 A.M.

Problems in the Teaching of Geography

Difficulties Encountered in the Use of Geography Texts in the Elementary Grades..
.....Ella Wilson
State Normal College, Ypsilanti, Michigan

Experiments in Teaching Geography.....William J. Berry
State Teachers College, Kalamazoo, Michigan

Geography in Foreign Countries.....Rose B. Clark
Nebraska Wesleyan University, Lincoln, Nebraska

The Training of Teachers of Geography.....George J. Miller
State Teachers College, Mankato, Minnesota

Maps, Illustrated by Lantern Slides.....A. W. Abrams
State Department of Education, Albany, New York

Report of Committee on Map Standards.....Albert G. Eldridge
State Normal School, North Adams, Massachusetts

Tuesday, December 29, 2:00-4:30 P.M.

Problems in the Teaching of Geography (continued)

Climates and Men.....Mark Jefferson
State Normal College, Ypsilanti, Michigan

Method in Geography.....Edwin H. Reeder
Teachers College, Columbia University

Research in the Teaching of Geography.....Nora Zink
School of Education, University of Chicago

Scope and Purpose of the Proposed Yearbook in Geography.....A. E. Parkins
George Peabody College for Teachers, Nashville, Tennessee

Tuesday, December 29, 6:30 P.M.

Annual Dinner

Address, Margins of Geography.....Griffith Taylor
University of Chicago

Meeting of the Board of Directors and Executive Committee

General Information

Headquarters and Registration Desk, Charles McKenny Hall, Michigan State Normal College.

All in attendance are invited as luncheon guests of State Normal College on Tuesday noon.

All sessions, committee meetings, dinners, in Charles McKenny Hall.

Annual Dinner, Charles McKenny Hall, $1.25 per person. Obtain tickets promptly at Registration Desk.

You may become a member of the National Council of Geography Teachers, or renew your membership for a year, by payment of $2.00 at the Registration Desk. Membership includes a year's subscription to the Journal of Geography.

Hotel Huron, European Plan, $1.50 and up. Write the hotel for reservations.

Rooms in private homes conveniently located, $1.00 per night per person. Reservation may be made in advance by addressing Dean of Women, State Normal College, Ypsilanti, Michigan, or on arrival, at the office of Charles McKenny Hall. Take taxicab from station to Charles McKenny Hall.

Meals served at Charles McKenny Hall at moderate prices.

Boy Scouts will be on hand to give assistance.

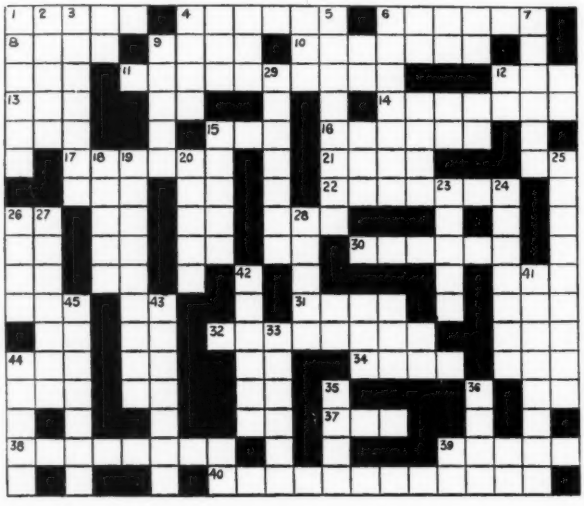
INTEREST-STIMULATING DEVICE

Crossword Puzzle

This Crossword Puzzle was worked out by Alex Chesnolovic, Grade 7, Junior No. 1, Trenton, N.J. It was prepared as a part of an exhibition on South America which the 7th grade classes gave at the close of their work on South America.

HELEN R. HARTSHORNE,
Trenton, New Jersey

-SOUTH AMERICA-



VERTICAL

1. Agricultural product of Peru
2. High mountains of South America
3. Capital of Venezuela
4. Rubber shipping port in Brazil
5. River port of Paraguay
7. Coffee port of Brazil
9. Semi-arid cotton-producing state in Brazil
15. Imitation ivory tree
18. Beast of burden
19. The southern territories of Argentina
20. Shoestring republic
23. City in tin mining district of Bolivia
24. Subtropical fruit
25. River of Colombia
26. Oilseed crop of the Pampa
27. A product of South America used on roads
28. Nominal capital of Bolivia
33. By-product from nitrate concentrates
35. Cocaine bearing leaves used by Indians
36. Country of the ancient Incas
41. Navigable lake in the Andes
42. Grasslands of the Orinoco
43. Town on the Guayas River
44. Seaport of Brazil
45. George Washington of South America

HORIZONTAL

1. Important product of Brazil
4. River of southeastern South America
6. Amazon seaport in Central Brazil
8. Hostile Indians of southern South America
9. Commercial city of the Cauca River Valley
10. Name of land-form where Panama Canal is dug
11. Chief sugar shipping port of Brazil
12. Insect pest of South America
13. English word for Yerba mate
14. Chief mineral export of Chile
15. Chief mineral export of Bolivia
16. Capital of the state of Matto Grosso
17. Animal raised for wool
21. Extensive ore deposit in Brazil
22. River of northern South America
30. Valuable wool and hide producing animal of the high Andes
31. Product of the Guianas
32. Falls in British Guiana
34. City founded by Pizzaro
37. Product of Venezuela near Lake Maracaibo
38. Foreign immigrants to Argentina
39. Pacific terminus of a Chilean-Bolivian railway
40. A Pacific port in Colombia

KEY TO CROSS-WORD PUZZLE

VERTICAL

1. Cotton
2. Andes
3. Caracas
4. Para
5. Asuncion
7. Santos
9. Ceara
15. Taqua
18. Llama
19. Patagonia
20. Chile
23. Oruro
24. Oranges
25. Magdalena
26. Flax
27. Asphalt
28. Sucre
33. Iodine
35. Coca
36. Peru
41. Titicaca
42. Llanos
43. Bodegas
44. Bahia
45. Bolivar

HORIZONTAL

1. Cacao
4. Parana
6. Manaos
8. Onas
9. Cali
10. Isthmus
11. Pernambuco
12. Ant
13. Tea
14. Nitrate
15. Tin
16. Cuyaba
17. Alpaca
21. Iron
22. Orinoco
30. Vicuna
31. Rice
32. Kaieteur
34. Lima
37. Oil
38. Italians
39. Arica
40. Buenaventura

EDITORIAL NOTES AND NEWS

Have you neglected to read some of the late summer geographical publications? Among their many articles are a few of current interest, dealing with economic and political movements in a few parts of the earth somewhat remote from us.

Mr. Whitbeck covers one such topic in his article on Chilean nitrate in *Economic Geography,* July, 1931. According to Mr. Whitbeck, Chile furnished only 20 per cent of the world's nitrate in 1929-30, due to the flooding of the market with cheaper synthetic products. To meet this competition, the Chilean government has dropped its tonnage tax on nitrate and hopes to get its revenue from its share of the profits of the Nitrate Corporation of Chile. This corporation in which the government is a half owner will use the Guggenheim processes of mining and of ore treatment and every effort will be made to keep the industry on a profitable basis. In turn, the government will turn over to the corporation large tracts of undeveloped nitrate lands. Every effort will be made to prevent a price-cutting war among the synthetic producers.

Another topic of current interest is the controversy over the sovereignty of East Greenland, claimed by Denmark and Norway. The claims of Norway to this coastal strip where some of their hunting expeditions winter are set forth in the September *American Scandinavian Review.* Danish Greenland now gets most of its profits from its fisheries, chiefly cod, and boasts a fish-preserving plant, run by electric power, and actually employing some native Greenlanders. Several sheep ranches, even a small mutton packing plant, supplement the fishermen's income.

Over at Port Churchill, terminal of the recently built Hudson Bay Railway, progress continues in port development. An article in the August *Canadian Geographical Journal* gives an illustrated account of the work accomplished. While the 2½ million bushel elevator is being constructed, boulders are being blasted and gravel hauled in to level the surface and fill the muskeg where the townsite will be located. A nearby lake will furnish water. To keep the water pipes from freezing in winter a pumping station will maintain a continuous flow of water thru insulated pipes. A central heating plant will supply steam heat to the town and the exhaust steam will keep the boxed-in sewage pipes from freezing. Just how long the port and Straits will remain icefree no one knows, possibly from the middle of July to the middle of November.

Information on the Soviet's farm program is difficult to get. In the July, 1931, *Economic Geography,* Miss Earle describes the mechanization of some of the new state and collective farm experiments on the treeless steppes near Rostov-on-Don. One, "Gigant," has an area of nearly 400,000 acres. In 1930, it produced about 3 million bushels of wheat. All the farm machinery is pulled by tractors and a fleet of 200 American combines harvests the grains.

Certain cities owe their prestige to the utilization of certain peculiarly favorable features of the natural site on which they are built. Later the political significance of those centers further some form of social development. This is illustrated in Washington, D.C., which has become a great educational and research center with more than 250 universities, colleges, and private schools. The city's aids to research come particularly from the Library of Congress, the Bureau of Standards, the Carnegie and other statistical institutions. A directory with a complete description of these educational institutions may be had from the Washington Chamber of Commerce.

Have you seen a copy of *School Life?* This monthly publication of the Federal Office of Education may be had for one year by sending fifty cents to the Superintendent of Documents, Washington, D.C. Its articles cover every phase and field of education.

A new Airway Map of the United States, Aeronautics Bulletin No. 8, dated August 1, 1931, is now available free from the Aeronautics Branch of the United States Department of Commerce.

An exhibit, The Habitations of Mankind, telling the story of the evolution of man's home from cliff dwellings to modern apartment houses is being shown in the Newark Museum, Newark, New Jersey. The exhibit is designed to correlate closely with the work done in the Newark public schools.

GEOGRAPHICAL PUBLICATIONS

W. G. Kendrew. **Climate.** 329 pp. 117 maps and diagrams. Oxford University Press, N.Y. 1930. $5.00

Readers with a particular interest in Climatology, those in need of some knowledge of the subject to aid them in some other branch of study, as well as the general reader seeking information on this significant element of the natural environment will find this companion volume to "Climates of the Continents" by the same author of considerable value.

The book is organized in ten parts each containing from two to ten chapters. Part I is devoted to a brief discussion of the author's viewpoint in regard to the scope and importance of climate. The various phenomena of climate are then discussed in turn. The inter-relation of one with the other and the bearing each has upon climate as a whole and upon world conditions are clearly shown. Special attention is given to the conditions which give rise to the variability of weather in the Temperate Regions, and in this connection some types of "British Weather" are discussed. Mountain and Plateau Climate also receives special notice.

The author concludes with brief incisive accounts of three climatic types, (1) The Sudan, illustrating seasonal rhythm, (2) The Mediterranean, and (3) The Westerlies, in which coastal (Vancouver Island) and interior (Manitoba) types in the belt of the Westerlies are shown in contrast.

Thruout the book the author adheres to the viewpoint that in Climatology we are primarily interested in facts and phenomena regarding the climates of the earth as elements in the natural environment. The presentation is practical, therefore, rather than theoretical. The more important features of climate are described in some detail and the physical principles underlying them are clearly enunciated. The book contains numerous well chosen, well executed grafs, diagrams and maps, which constitute a valuable supplement to the text. The geographical distribution of climatic phenomena, with their influence upon the distribution and characteristics of plant and animal life, and their relation to human life and activities, is always given a prominent place in the discussion.

JOHN B. APPLETON

Scripps College
Claremont, California

Ross F. Lockridge. **La Salle.** 303 pp., 2 maps, 33 pictures. World Book Company, Yonkers-on-Hudson. 1931

This is the third of a series of biographies from the pen of an author who seeks to make the past live by recounting the life and deeds of its great men. The first two books of the series portray the lives of George Rogers Clark and A. Lincoln. This new biography follows the adventures of Rene Robert Cavelier, the Sieur de La Salle, one of the most colorful figures among the early explorers of North America.

La Salle, more than any other character, reflects the ambitions, dreams, and spirit of France in its Golden Age, the reign of Louis XIV, and it is around this intrepid explorer, missionary and statesman that the author weaves the story of the struggle of France for a vast empire in America.

In order to create a proper background for the story, Mr. Lockridge takes the reader back to Rouen, La Salle's boyhood home in France, and recounts his early training for the Jesuit priesthood and the events that led to the renunciation of the life in a cloister for that of an explorer. Then we follow the adventures of La Salle step by step as he explores the country between the Great Lakes and the Ohio, descends the Mississippi to its mouth, and on to his tragic death. The volume carries a strong appeal to those interested in the early history of the Great Lakes and Mississippi valley.

The author has had access to many original records, namely, "Jesuit Relations," and the journal of La Hontan and Charlevoix, as well as a wealth of written history dealing with the character and the period. He quotes freely from the sources, and a considerable part of the book consists of exact utterances from the life of the actors. The author expresses the hope that the quotations might help "to create an atmosphere of time and place and give a series of personal contacts with La Salle, with Tonty, with White Bear, with sandaled friars, coureurs de bois, Indians, and with the Iron Governor and the Grand Monarch."

The author is naturally more concerned with the events of history than the geography of the region where the events took place. In chapter three, however, we read "The destiny of New France was closely linked with the Great Rivers of America." And again in chapter nine we find, "Portages or watersheds are connecting links of land between water systems. . . . Portages always played a large part in the career of La Salle."

The style and vocabulary of the book is adapted to the mature student rather than to the children of the elementary grades. Such words and phrases as "nominal beginning," "doughty friars," "recompense his spirit," "rigid asceticisms," and "picturesque episode, dramatically enacted" are words which would give the junior high school student considerable difficulty.

The book will be a welcome addition to libraries seeking new material on an interesting character in early America history.

INA CULLOM ROBERTSON

State Teachers College
Valley City, North Dakota